

# PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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## COMPLETE SPECIFICATION.

### Spring Assembly for Spring Cushions.

We, FLEX-O-LATORS, INC., a Corporation duly organized and existing under the laws of the State of Missouri, United States of America, of 131 Locust Street, Carthage, State of Missouri, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to new and useful improvements in spring assemblies for spring cushions, and has particular reference to spring assemblies of the type comprising a series of substantially planar spring units disposed in spaced apart vertical planes and each connected to a furniture frame only at its opposite ends.

This type of spring assembly has distinct advantages in that the units may be placed flat in a very compact package for storage, handling and shipping, thus overcoming the well-known disadvantage that such assemblies are usually extremely bulky in proportion to their weight, and are hence difficult to store and expensive to ship. They are also quite simple and economical to install, and do not require specially fabricated or complicated furniture frames to accommodate their use.

On the other hand, spring assemblies of the type described have to our knowledge been subject to a serious disadvantage in that since the individual spring units are each secured to the frame only at their ends, without intermediate support, the span of said units are quite large, and difficulty is therefore experienced in providing desirable characteristics of yieldability. For example, such assemblies have a tendency to sag objectionably in the central portion thereof when a full load is applied thereto. Attempts to reinforce the central span portion of the spring units, in order to prevent this sagging and to preserve a neat appearance, have resulted in an assembly which is objectionably "hard" or stiff when, for instance in a cushioned chair, a person first applies his weight thereto.

The principal object of the present invention is, therefore, the provision of a spring assembly of the general character described which overcomes the objectionable features above discussed, which provides the desired "softness" or yieldability when weight is first applied thereto, but wherein the stiffness is gradually increased as the weight applied increases, in order to prevent undue sagging and to preserve a neat, tailored appearance. Generally, this object is accomplished by forming each spring unit as a compound member comprising two separate springs, these two springs being so related that substantially only one of the springs is effective during the initial deflection of the assembly, the other of said springs being gradually brought into play to reinforce the first as the deflection increases.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use in a wide variety of types of furniture, and for other purposes.

With these objects in view, as well as other objects which will appear in the course of the Specification, reference will be had to the drawing, wherein:—

Fig. 1 is a top plan view of a spring assembly embodying the present invention;

Fig. 2 is a sectional view taken on line II—II of Fig. 1, with portions broken away;

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Fig. 3 is an enlarged sectional view taken on line III—III of Fig. 2.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to a furniture frame which will by way of example be denoted a seat frame, although it will be apparent that the invention is equally adaptable to back frames, couches, divans, and in any place a spring cushion may be used. Said frame as shown is formed of wood and is of rectangular form, comprising a front rail 4, back rail 6, and parallel side rails 8, all rigidly joined together. Secured to said frame are a plurality of compound spring units 10 disposed in parallel vertical planes spaced regularly across the width of the frame. Each of said spring units comprises a main spring 12 and an auxiliary spring 14, both formed of flat strips of spring steel or other suitable material.

Main spring 12 comprises a substantially straight central portion 16 which is disposed above and approximately parallel to the plane of the frame, and which in conjunction with the like portions of the other units forms the load-supporting platform of the assembly. At each end of said central portion, spring 12 is bent to form an inwardly converging V-formation, having an inwardly and downwardly inclined leg 18 connected to central portion 16 by bend 20, and an outwardly extending substantially horizontal leg 22 connected to the lower end of leg 18 by bend 24. Legs 22 extend respectively over the upper surfaces of front and rear frame rails 4 and 6, and are each provided with a terminal leg 26 bent downwardly to overlap the outer surfaces of said rails.

Auxiliary spring 14 is shaped somewhat similarly to the main spring. It comprises a central portion 28 which is bowed slightly to an upwardly convex form, and which is fixed at its mid-portion to the mid-portion of central portion 16 of the main spring by rivet 30. Normally, portion 28 of the auxiliary spring contacts portion 16 of the main spring only directly adjacent said rivet, the end portions of portion 28 curving gradually downwardly from portion 16. At each end of portion 28, which is substantially shorter than the corresponding portion 16 of the main spring, the auxiliary spring is provided with an inwardly and downwardly inclined leg 32 which lies against the corresponding leg 18 of the main spring and is connected thereto by a rivet 34, and an outwardly extending approximately horizontal leg 36 lying against the corresponding leg 22 of the main spring and fixed thereto by rivet 38. Legs 32 and 36 of the auxiliary spring are connected by a bend 40 which lies against the bend 24 of the main spring. Legs 32 of the auxiliary

spring are connected to the central portion 28 thereof by bends 42 which are spaced inwardly from bends 20 of the main spring. Each of the legs 36 of the auxiliary spring is provided at its outer end with a downturned terminal leg 44 which lies against the corresponding terminal leg 26 of the main spring. The spring unit is fixed to frame rails 4 and 6 by rails 46 or other suitable fasteners which extend through both the main and auxiliary springs and are anchored in said rails. All of spring units 10 are interconnected and stabilized against movement transverse to their planes by a plurality of flexible steel tie strips 48 extending transversely across the load-supporting platform of the assembly, each of said strips being secured to the central portion 16 of each main spring at its point of intersection therewith by a suitable fastener such as rivet 50. The illustration shows two such tie strips disposed respectively at the forward and rearward edges of the load-supporting platform, although it will be evident that any desired number of ties could be used. It will of course be understood that the assembly shown is in use covered by suitable layers of padding and upholstery.

The operation of the assembly is substantially as follows:—

As weight is applied initially to the cushion, it will be seen that the deflection will be confined principally to the central portions 16 and 28 of the main and auxiliary springs of each spring unit 10. This results from the fact that the V-shaped formations at the forward and rearward ends of each unit are of double strength, since the main and auxiliary springs are rigidly riveted together in these regions, while main spring portion 16 initially contacts and is supported by the auxiliary spring only at its midpoint. Auxiliary spring portion 28 is of only slight curvature, and hence may be deflected downwardly easily during the first portion of its movement.

However, as the weight applied to the cushion increases the deflection of main spring portion 16 increases and a gradually increasing portion thereof is brought into direct contact with auxiliary spring portion 28. The "free" lengths of the spring portions 28, that is, the portions thereof between bends 42 and their points of contact with main spring portion 16, hence become progressively shorter, and therefore stiffer and more resistant to deformation. Eventually the main spring portion 16 rest directly on bends 42 of the auxiliary spring. Since these bends are of rather short radius they are relatively stiff and rigid as compared to the remainder of the springs, and therefore serve as new "end supports" for portions 16 of the main springs, and in effect shorten

the span of said portions 16 and increase the stiffness thereof. Moreover, during any further deflection of the spring units, the main and auxiliary springs act as a single spring of double strength, since they are in contact along virtually their entire lengths.

Thus it will be seen that a spring assembly having novel advantages has been produced. It has an initial "soft" or yieldable action which is essential to an effect of comfort, but then stiffens or "hardens" as the load applied thereto is increased, whereby to prevent undue sagging and deformation thereof. This is particularly important in assemblies as shown made up of units securedly only at opposite edges of a frame, since the considerable span of such units has heretofore rendered them subject either to excessive sagging under load in the midportion thereof, or to excessive initial stiffness or "hardness" if sufficiently reinforced to prevent the sagging. Moreover, the transition from the "soft" to the "hard" actions is accomplished without "steps" or sudden changes of yieldability, which would of course be objectionable. The spring units 10 are self-contained, and since they are generally planar could obviously be stored, handled or shipped in compact, economical packages, the tie strips 48 being applied when the units are assembled in frame 2. Also, the entire assembly, including tie strips 48, could be folded flat and compact, with a parallelogram action, by pivoting the spring units and tie strips relatively about rivets 50.

#### WHAT WE CLAIM IS:—

1. A spring assembly for spring cushions comprising a plurality of spring units carried by a frame in parallel, horizontally spaced apart relation, each of said spring units being disposed in a substantially vertical plane and comprising a main spring formed of a length of resilient strip material having a generally straight central portion disposed above and generally parallel to said frame and end portions connected to said frame, said central portion forming the load supporting platform of said assembly in conjunction with the like portions of the other of said spring units, and an auxiliary spring secured to said main spring and formed of a length of resilient strip material, said auxiliary spring having a central portion disposed directly beneath the central portion of the main spring, the central portions of the main and auxiliary springs being secured together substantially at the midpoints thereof, and being gradually divergent in both directions from said midpoints, whereby the contact area between

said central spring portions will be gradually increased as said spring unit is deflected downwardly, the central portion of said auxiliary spring being shorter than the central portion of said main spring and being provided at each end with a relatively rigid end portion seated on the corresponding end portion of said main spring, said relatively rigid end portions being operable to engage and support the central portion of said main spring when said spring unit is deflected downwardly, whereby to shorten the effective span of said main spring.

2. A spring assembly as set forth in Claim 1, in which said main and auxiliary springs each having a downwardly and inwardly inclined leg connected to each end of its central portion, and an outwardly extending terminal leg connected to the lower end of each of said inclined legs, the outer ends of said terminal legs being secured rigidly to said frame, and the inclined and terminal legs of both of said springs being rigidly secured together, the central portion of said main spring being substantially straight and the central portion of said auxiliary spring being curved in an upwardly convex form and normally engaging said main spring only at the central portion thereof.

3. A spring assembly as set forth in Claim 2 wherein at least the central portions of said main and auxiliary spring are formed of material having a rectangular cross-sectional contour the major axes of which are disposed at right angles to the plane of the spring unit.

4. A spring assembly as set forth in Claim 2, wherein the central portion of said auxiliary spring is substantially shorter than the central portion of said main spring, and wherein the central portion of the auxiliary spring is connected to the inclined legs thereof by relatively sharply curved and rigid portions seated on the inclined legs of said main spring, said last named curved portions acting as end supports for the central portion of the main spring when the spring unit is deflected, whereby to shorten the effective span thereof.

5. A spring assembly for spring cushions substantially as described and shown in the accompanying drawing and for the purpose set forth.

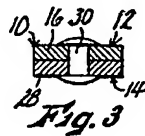
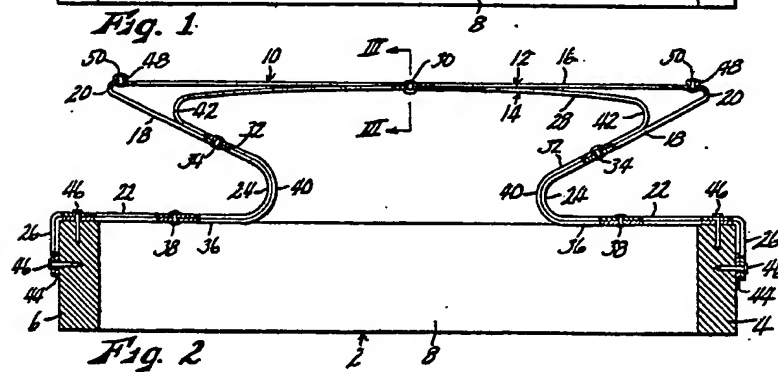
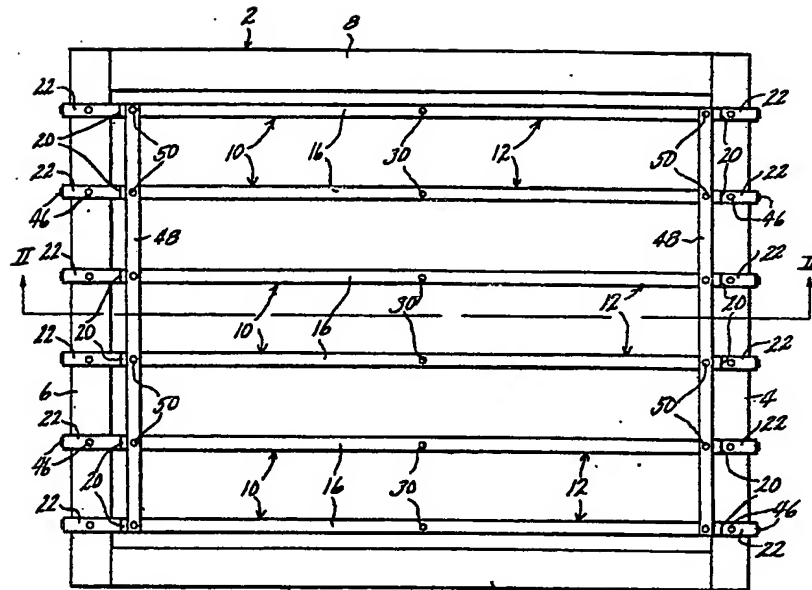
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COMPLETE SPECIFICATION

1 SHEET

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